

Magnetosheath Neutral Atom Observations and the Relationship With Radar Backscatter
in the Cusp: Combined Observations From IMAGE LENA and SuperDARN

Khan, H
Collier, M R
Thomas E. Moore

hina.khan@gsfc.nasa.gov
michael.collier@gsfc.nasa.gov
thomas.e.moore@gsfc.nasa.gov
NASA/GSFC, Greenbelt, MD 20771

Lester, M

mle@ion.le.ac.uk
University of Leicester, Radio and Space Plasma Physics,
University Road, Leicester, LE1 7RH United Kingdom

Taguchi, S
Hosokawa, K

taguchi@ice.uec.ac.jp
hosokawa@ice.uec.ac.jp
University of Electro-Communications, 1-5-1 Chofugaoka,
Chofu 182-8585 Japan

In this study we present preliminary observations showing the relationship between charge exchanged neutral atom emissions from the magnetosheath and the appearance of cusp-like signatures in the ionosphere. The Low Energy Neutral Atom imager on IMAGE can be used to detect the magnetosheath neutral atom signature during strong southward IMF conditions. Correspondingly, under such conditions, dayside reconnection is enhanced and the ground based SuperDARN radars monitor the increase in the flow and backscattered power associated with enhanced activity in the cusp. We present data from the SuperDARN radars, showing typical cusp signatures during the period of enhanced neutral atom emissions observed by LENA. We show that there is a significant correlation between the backscattered power at high latitudes detected by the radar and the ENA emission recorded at LENA. As the magnetopause is eroded due to the increased reconnection activity, the neutral density near the reconnection site will be higher than under normal conditions, resulting in a higher flux of charge exchanged neutral atoms observed by LENA. Also there may be a greater influx of magnetosheath particles which can charge exchange in the magnetosphere resulting in an increase in neutral atom emissions observed by LENA. The particle precipitation also ionizes the high latitude ionosphere producing irregularities resulting in an increase in the radar backscattered power. We present the observations showing the relationship between the ENA emissions and the radar backscatter in the cusp region.